

Aug. 2, 1938.

C. B. HALL ET AL

2,125,341

COATED FABRIC AND PROCESS OF MAKING SAME

Filed Oct. 10, 1934

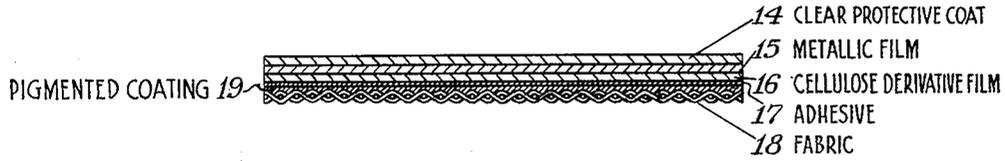


Fig. 1

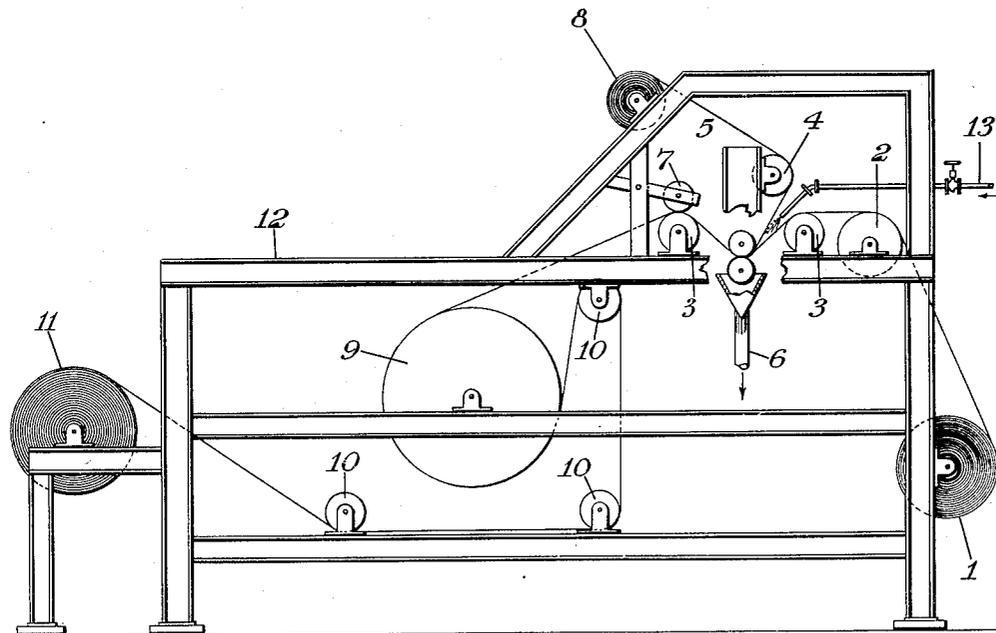


Fig. 2

INVENTORS

Carroll B. Hall
John Dorman McBurney

BY

Frank C. Hilberg

ATTORNEY.

UNITED STATES PATENT OFFICE

2,125,341

COATED FABRIC AND PROCESS OF MAKING SAME

Carroll B. Hall, Beaver Falls, and John Dorman
McBurney, Newburgh, N. Y., assignors to E. I.
du Pont de Nemours & Company, Wilmington,
Del., a corporation of Delaware

Application October 10, 1934, Serial No. 747,666

5 Claims. (Cl. 154—2)

This invention relates to the production of coated textiles, particularly to the production of a high luster metallic finish on coated textiles, and more particularly to the production of such a highly lustrous finish on cellulose derivative coated fabrics.

Leather substitutes and coated fabrics possessing lustrous metallic surfaces have been known to the art, and have found wide use in the shoe, millinery and novelty trade because of their ornamental appearance. The metallic finishes on such coated fabrics resemble an unburnished piece of metal such, for example, as aluminum or bronze, the surface being bright but not brilliant. These finishes are produced by applying a cellulose derivative composition containing bronze or aluminum particles in suspension to a coated or uncoated base by means of a doctor knife or other device known to the art.

This coating is dried by passing the coated material through a heated chamber to expel the volatile constituents of the composition. Such metallized coated fabrics are characterized by a clothly appearance, due to the prominence of the weave of the base fabric which even the pigmented cellulose derivative coating does not conceal, and the luster is not of high degree.

Another type of highly lustrous metallic finish on artificial leather is produced by applying to the surface of a coated fabric a suitable adhesive, drying this adhesive until it possesses the right degree of tack, dusting on a metal powder such as bronze, aluminum or the like, burnishing to orient the particles so that the light reflecting surfaces will be in a single plane, and finally baking to set the adhesive and hold the particles in the oriented position. Such a process is disclosed in an application filed March 17, 1933, Serial No. 661,418 by McBurney and Nollau, a continuation of which matured into Patent No. 2,087,094.

Other processes have been suggested in which fabrics or leather have been coated with bronze paint in various manners. One modification consists in applying an adhesive to leather and then dusting on metallic powder without burnishing, however, the finished surfaces produced by these methods when applied to woven fabrics present a clothly appearance.

This invention has as an object the production of highly lustrous metallic finishes on such surfaces, particularly on cellulose derivative coated textiles. This is accomplished by combining to a smooth flexible base material, such as a cellulose derivative coated textile, by means of a suitable adhesive, a preformed clear transparent cellulose derivative film to which a highly lustrous metallic finish has been applied before combining, by application of a suitable adhesive, drying said adhesive until it possesses the requisite degree of tackiness to result in the orientation in one plane of all light reflecting surfaces of metal powder or flakes subsequently dusted on the adhesive surface, removal of the excess of metal powder or flakes by buffing, and finally baking to set the adhesive, holding the particles in this oriented position.

In the drawing Figure 1 represents a diagrammatic arrangement of the different parts, and is intended to be merely illustrative and not drawn to scale. Figure 2 is a side elevation of a machine suitable for joining the two preformed films.

In Figure 1, 18 represents the original fabric which is coated with a pigmented or clear coating 19; 16 represents a preformed cellulose derivative film, 15 denotes a metallic film and 14 a clear protective coat. The parts 14, 15 and 16 are preformed as one sheet material; 18 and 19 are likewise preformed, and the two layers are joined by adhesive 17.

In Figure 2, 1 represents the unbatch roll, 2 is a spreader roll, 3 are pipe rolls, 4 is a crown roll, 5 denotes the combining roller and bearings, 6 a drip pan and drain, 7 knives, 8 film unbatch roll, 9 a pull roll, 10 snub rolls, 11 the final wind-up roll, 12 is the frame and 13 denotes a pipe through which the adhesive is supplied.

In operation the coated fabric is unwound from roll 1 and passes over spreader roll 2 and pipe roll 3. The preformed film is unrolled from 8 over crown roll 4 and the two components are supplied with the adhesive and passed between the combining rolls 5. The combined fabrics then pass over pipe roll 3 and the edges are trimmed with knives 7. The material then passes over the pull roll 9, the tension being varied by means of snub roll 10. The material is then wound up on the final roll 11.

The coated fabric may be made by the deposition on a suitable textile base of a film of the following approximate composition by weight:

	Per cent
Cellulose nitrate.....	26-23
Softener.....	46-52
Pigment.....	28-25

For some purposes the pigment may be omitted entirely, and the base fabric is then coated with

a composition containing from 50 to 95% cellulose nitrate and 5-50% softener. Such films may be deposited best from a dispersion in organic solvents such as low boiling esters or alcohols or combinations of esters, ethers, alcohols and hydrocarbons. The softener may be raw or blown castor oil, blown cottonseed oil, coconut oil, or a plasticizer such as dibutyl phthalate, tricresyl phosphate, acetyl laurins or dilauryl phthalate, and the pigment may be any inorganic or mineral coloring matter. The film is usually built up on the fabric by a plurality of coatings of the composition.

The composition of the adhesive used to join the preformed film is as follows:

	Range	Preferred
	Percent	Percent
20 Cellulose nitrate.....	0-10	0.87
Ethyl acetate.....	40-20	35.65
Ethyl alcohol.....	60-40	53.48
Dibutyl tartrate.....	0-30	10.00
	100-100	100.00

A cellulose nitrate having a viscosity characteristic of 20 seconds as determined by the $\frac{1}{4}$ inch falling sphere method when dispersed in a solvent mixture comprising 40% ethyl acetate and 60% ethyl alcohol with a nitrogen content of approximately 12.0% and an ethyl alcohol solubility of approximately 5% has been found to be most satisfactory, although it is to be understood that other types of cellulose nitrate may be used.

The clear transparent preformed cellulose derivative film may have been prepared by any of the methods known to the art, such as casting a film from a suitable dispersion onto a metal drum, drying, and subsequently removing the film. Such a preformed film, as for example a cellulose acetate sheet preferably 0.003" in thickness, is given by means of a doctor knife, a coating of the following anchoring composition:

	Per cent
45 *Resin.....	43.88
High Flash naphtha.....	35.75
Mineral Thinner.....	17.38
Cobalt linoleate solution in mineral thinner.....	1.06
50 Manganese linoleate solution in mineral thinner.....	1.93
	100.00

*The resin in this example may be any drying oil or drying oil acid modified polyhydric alcohol-polybasic acid resin.

The quantity of cobalt and manganese drier corresponds to 0.1% metallic cobalt and 0.1% metallic manganese, respectively, based on the drying oil content of the resin. This coating is applied so that about 0.4-2.0 ounces per square yard is deposited. The material is then passed through a chamber heated to a temperature between 150° F. and 200° F., forced draft being employed during the operation for the removal of the volatile solvent. The time of passage through the drying chamber is adjusted so that the film is "dust free" but still slightly tacky when it emerges from the drier. After leaving this drying chamber aluminum powder or flake is applied to the coated surface, and the surface is buffed by mechanical equipment consisting of a series of oppositely revolving brushes. The material is then given a baking treatment either by festooning in a chamber at a temperature of

approximately 190° F. for a period of two hours or by passing said material over a revolving steam heated cylinder at least 15 feet in circumference at a speed of approximately 8 lineal feet per minute, said cylinder being heated to a temperature of 220° F. It is to be understood that heated cylinders of other sizes and at different temperatures may be used by altering the rate at which the material passes over it. The material is then ready to be combined to the coated fabric.

This is accomplished in the manner indicated above in the explanation of Figure 2.

In place of the cellulose acetate sheet, preformed films of cellulose nitrate, ethyl cellulose, or regenerated cellulose may be used. The films do not necessarily have to be 0.003" in thickness but thicker or thinner may be used, the practical working range of thickness varying from 0.001" to 0.005". Preformed pigmented or dyed cellulose derivative films prepared in the same manner as the clear transparent films herein described may also be used in the present invention. The preparation of these films per se does not form a part of the present invention except as they are used in preparing the high luster metallic finish.

In place of the composition disclosed above as a combining adhesive, a mixture of other esters, ketones, and alcohols or mixtures thereof, may be used such as butyl acetate and isopropyl alcohol or acetone, methyl acetate and butyl alcohol, and similar combinations. Dilute dispersions of cellulose esters or ethers or adhesive compositions made with certain proteins such as, for example, glue and gelatin may also be used as adhesives for combining the film to the coated fabric.

Instead of the linseed oil-China-wood oil modified polyhydric alcohol-polybasic acid resin of the above example, there may be used as an anchoring composition a resin prepared by heating at a temperature of 200° F. to 225° F. in a suitable vessel fitted with a reflux condenser and stirring device the following ingredients:

	Parts by weight
Glycerol.....	17.3
Linseed oil acids.....	55.5
Phthalic Anhydride.....	27.2

until the acid number of the resulting reaction product is less than 10.0. Other drying oils and other proportions of oil may be used, nor is the invention restricted to the oil modified polyhydric alcohol-polybasic acid resins, for mixtures of phenol-formaldehyde resin and oil modified polyhydric alcohol-polybasic acid resins are particularly effective. Cellulose ester adhesives may also be used as well as others which are well known to those versed in the art.

The product of the invention may be used for many purposes where combined metal foils are at present used as, for example, in fancy opera shoes, pocketbooks, book covers, motion picture screens, railway car curtains, outdoor signs, millinery and the general decorative art. Usually attractive effects may be obtained by the use of colored metal powders.

The present invention combines the advantages of the high luster of a metallic surface with the flexibility and toughness of fabric backing. It shows the advantage over fabric or paper backed metal foil in that it will withstand creasing, wrinkling, and flexing without becoming permanently altered in appearance. It shows further advantage over the earlier art in its brilliant high re-

reflecting surface resembling the brightly polished surface of a smooth piece of metal, and in its freedom from scratches, streaks, and clothiness. It presents the further advantage of requiring less coating on the base material to obtain a smooth surface than is the case of finishes produced by the methods of the prior art. Another important advantage of the material produced in accordance with the present invention is the heat reflecting property of the surface. Actual test has shown that a temperature increase behind the material was only 9° F. as against 25° F. in the case of metallic surfaced materials previously known, both figures referring to sheet aluminum. This property makes the material valuable for insulating purposes where the fragility of metal foils is a drawback to their use.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof and, therefore, it is not intended to be limited except as indicated in the appended claims.

We claim:

1. Process of producing a high metallic luster on flexible sheet material which comprises coating a fabric base with a cellulose derivative composition containing a plasticizer, preparing a separate cellulose acetate film, applying an adhesive to the said film allowing the adhesive to dry to the dust-free state, and while the adhesive is in this condition applying a coating of metal powder and orienting by brushing, removing the excess powder, and joining the said acetate film to the said coated fabric by means of an adhesive, whereby a material having a mirror-like lustre is obtained.

2. Process of claim 1 in which the metal powder is aluminum.

3. Process of claim 1 in which the metal powder is fixed to the acetate film by means of a polyhydric alcohol-polybasic acid type resin.

4. Process of producing a metallic luster on a flexible sheet material which comprises coating a fabric base with a composition containing a cellulose derivative, plasticizer, and pigment; allow-

ing the same to dry, applying a thin coat of adhesive containing cellulose nitrate, alcohol, ethyl acetate, and dibutyl tartrate; preparing an aluminum bearing film of high metallic luster by coating a clear preformed cellulose acetate film with an adhesive containing the reaction product of glycerol triphthalate, linseed oil, phthalic anhydride and China-wood oil; high flash naphtha, mineral thinner, cobalt linoleate and manganese linoleate solution; heating between 150 to 200° F. until the adhesive is tacky, applying a liberal dusting of aluminum powder, brushing off the surplus, burnishing; and applying this coated acetate film to the above mentioned fabric coated with wet adhesive and passing the composite sheet material through two or more rolls.

5. Process of preparing a laminated fabric having a highly reflective metallic surface which comprises coating a fabric with a composition lying within the following formula with respect to solids:

	Per cent
Cellulose nitrate.....	26-23
Softener	46-52
Pigment	28-25

allowing the same to dry, applying a cement thereto having a composition lying within the following formula:

	Per cent
Cellulose nitrate.....	0-10
Solvent	40-20
Diluent	60-40
Plasticizer.....	0-30

casting a cellulose derivative film, applying an anchor coat thereto containing a polyhydric alcohol-polybasic acid type resin, allowing the same to dry until it is "dust free", applying a dusting of aluminum powder thereto, removing the excess, burnishing, and cementing the said cast film to the said coated fabric.

CARROLL B. HALL.
JOHN DORMAN McBURNEY.